



Toshiba Matsushita Display Technology Co., Ltd.

31cm COLOUR TFT-LCD MODULE
(12.1 TYPE)

PRODUCT INFORMATION

LTD121EXSS
(p-Si TFT)

FEATURES

- (1) 12.1"WIDE-XGA(1280x800 pixels) display size for notebook PC
- (2) LED Backlight (LED 42pcs : 7 Serial connection x 6)
- (3) Low reflection, Glare surface

TENTATIVE

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (typ.)	270.5(W) x 180.0 (H) x 2.9/4.6(D) mm
Number of Pixels	1280 (W) x 800(H) pixels
Active Area	261.12(W) x 163.2(H) mm
Pixel Pitch	0.204(W) x 0.204(H)
Weight (approximately)	183 g (typ)
Backlight	LED

ABSOLUTE MAXIMUM RATINGS

Item		Min.	Max.	Unit
Supply Voltage	(V _{DD})	-0.3	4.0	V
	(V _{LED})	0	5.0	V
LED Current (I _{LED})		-	30	mA
Input Signal Voltage (V _{IN})		-0.3	V _{DD} +0.3	V
Operating Temperature		0	50	°C
Storage Temperature		-20	60	°C
Storage Humidity		10	90	%(RH)

ELECTRICAL SPECIFICATION

Item	Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	(V _{DD})	3.0	3.3	3.6	V
Supply LED Currency	(I _{LED})	---	---	20	mA
Common Mode Input Voltage	(V _{CM})	1.0	1.25	2.0	V
Differential Input Amplitude	(V _{ID})	100	---	600	mV
Current Consumption	*1 (I _{DD})	---	(240)	(315)	mA
	*2 (I _{LED})	---	---	20	mA
Power Consumption	---	(3.6)	---	W	I _{LED} =20mA

*1 : 8 color bars pattern

*2 : The current value of each row should be the same value.

OPTICAL SPECIFICATION (Ta=25°C)

Item	Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (CR)	200	(250)	---	---	
Response Time	(t _{ON})	---	40	ms	
	(t _{OFF})	---	40	ms	
Luminance (L)	210	300	---	cd/m ²	I _{LED} =20mA

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*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba Matsushita Display technology before proceeding with the design of equipment incorporating this product.

- LTD121EXSS

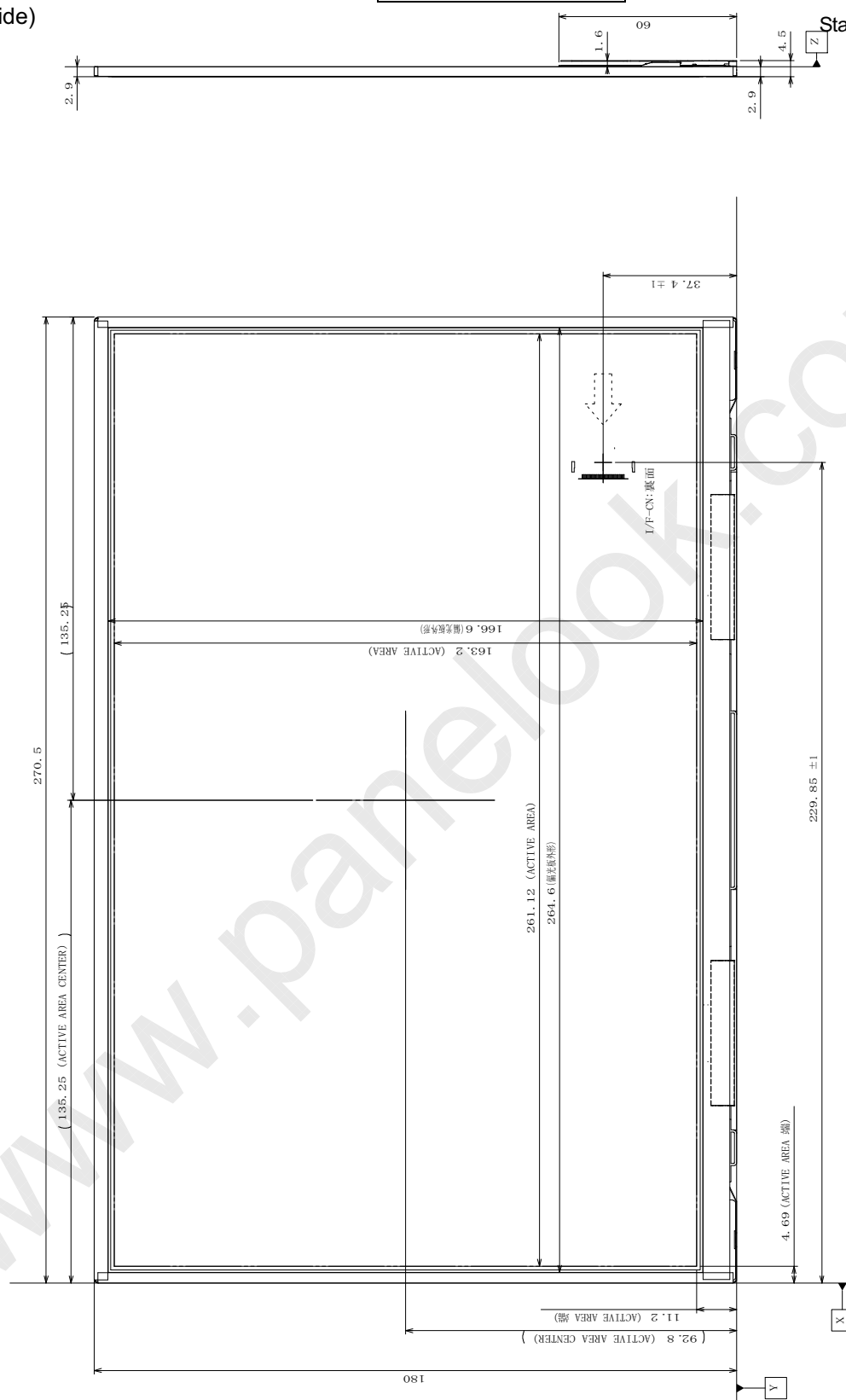
DIMENSIONAL OUTLINE

(Front side)

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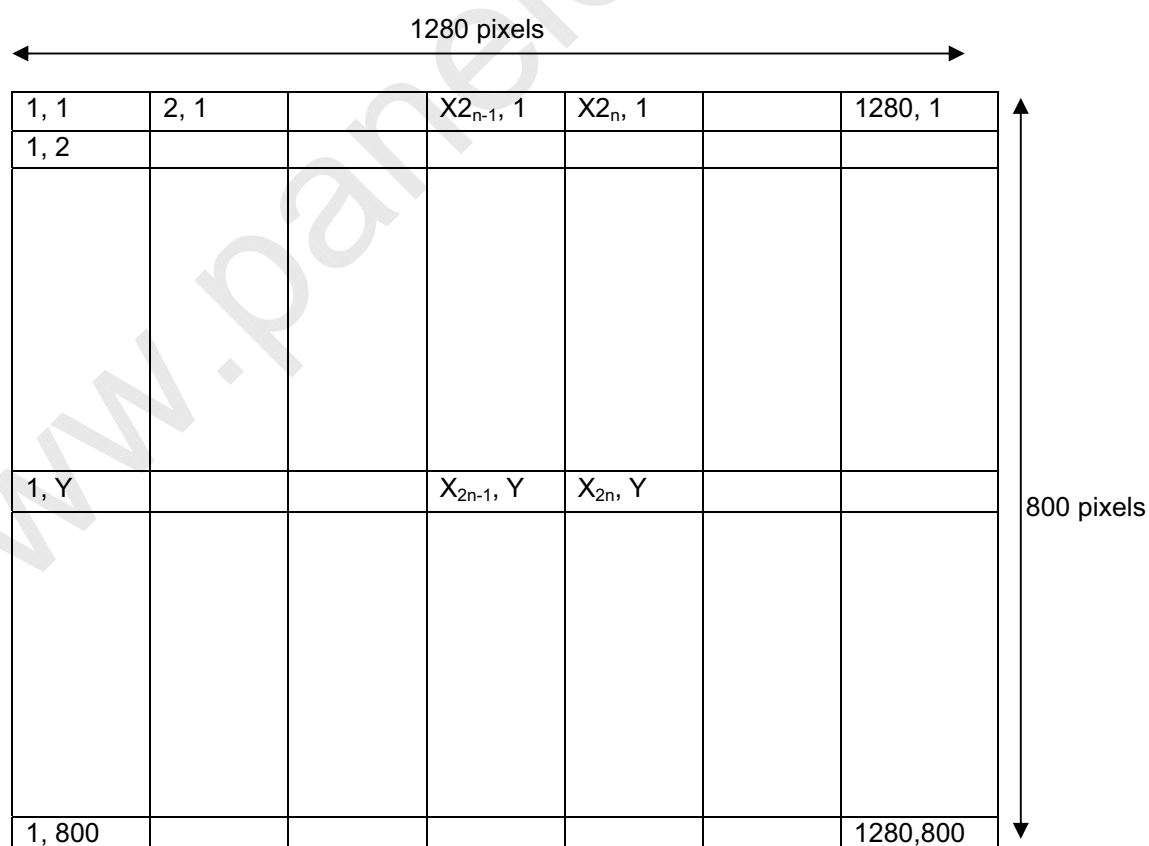
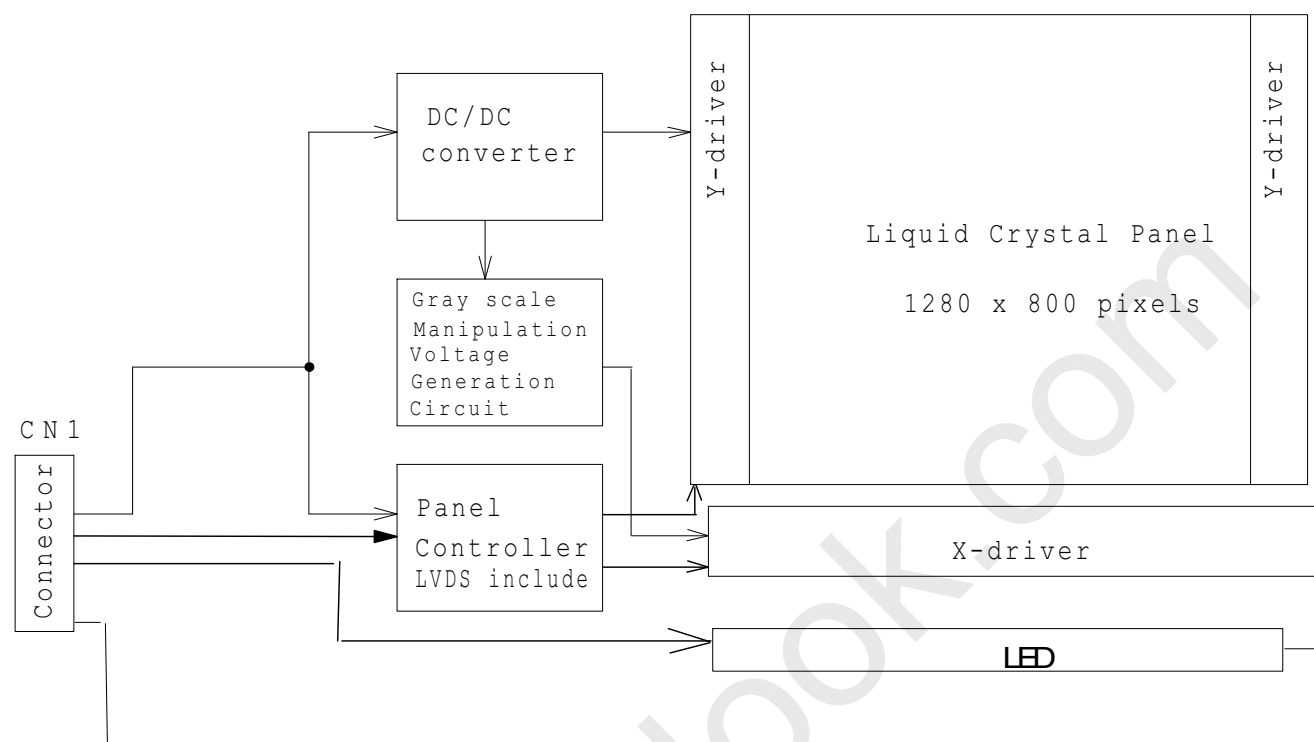
Unit : mm

Standard tolerance : ± 0.5



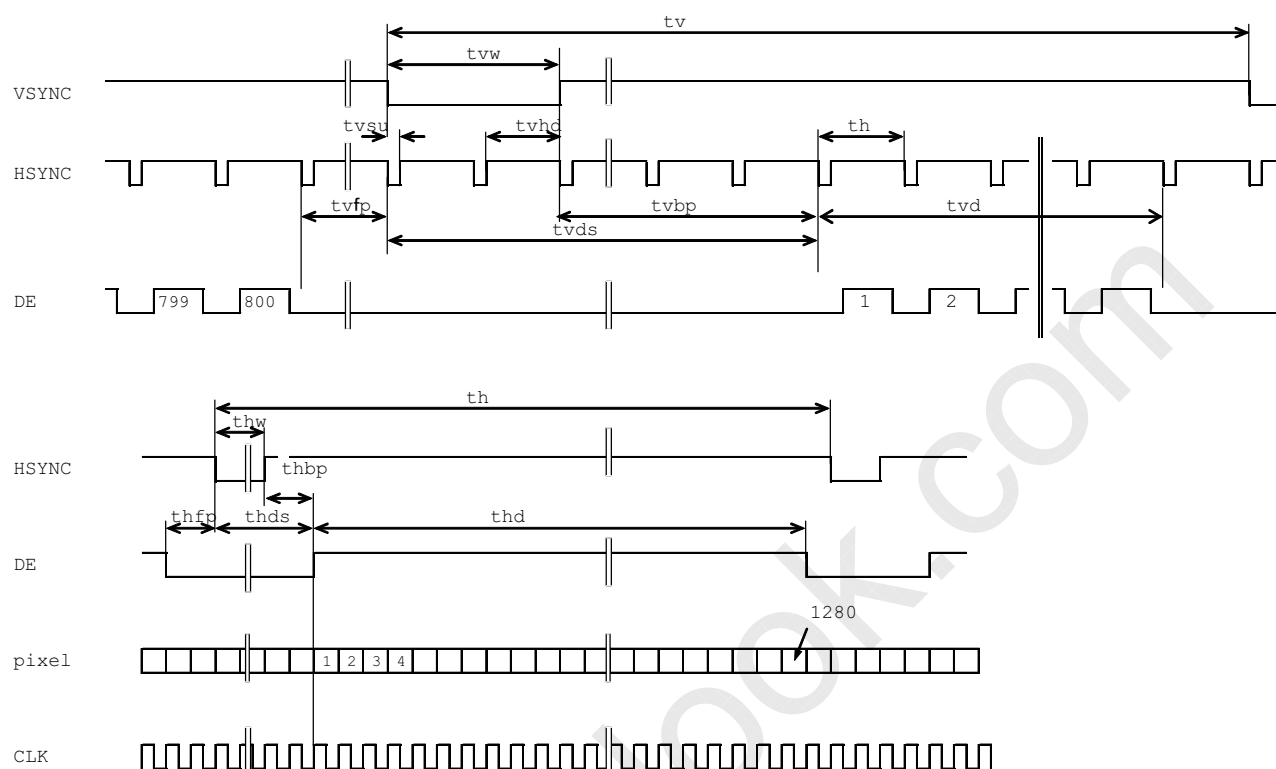
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BLOCK DIAGRAM



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TIMING CHART



**TIMING SPECIFICATION** ^{1) 2) 3) 4) 5) 6)}

Item	Symbol	min.	typ.	max.	unit
Horizontal Scanning Term	th	1650x tc	1680 x tc	1710 x tc	clock
H-sync Pulse Width	thw	4 x tc	128 x tc	—	clock
Horizontal Front Porch	thfp	4 x tc	72 x tc	—	clock
Horizontal Back Porch	thbp	4 x tc	200 x tc	—	clock
Horizontal Display Term	thd	1280 x tc	1280 x tc	1280 x tc	clock
Frame Period	tv	808 x th	831 x th	850 x th	line
V-sync Pulse Width	tvw	1 x th	6 x th	—	line
Vertical Front Porch	tvfp	1 x th	3 x th	—	line
Vertical Back Porch	tvbp	2 x th	22 x th	—	line
Vertical Display Term	tvd	800 x th	800 x th	800 x th	line
Clock Period	tc	11.76(85MHz)	11.98(83.5MHz)	12.35(81MHz)	ns

Note 1) Refer to "Timing Chart" and LVDS specifications in TIA/EIA-644.

Note 2) If DE is fixed to "H" or "L" level for certain period while NCLK is supplied, the panel displays black with some flicker.

Note 3) If NCLK is fixed to "H" or "L" level for certain period while DE is supplied, the panel may be damaged.

Note4) $tvb = tvw + tvfp + tvbp$

$thb = thw + thfp + thbp$

Note5) In case of using the long frame period, the deterioration of display quality, noise etc. may be occurred.

Note6) NCLK count of each Horizontal Scanning Time should be always the same.

V-Blanking period should be " n " X "Horizontal Scanning Time". (n : integer)

Frame period should be always the same.

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

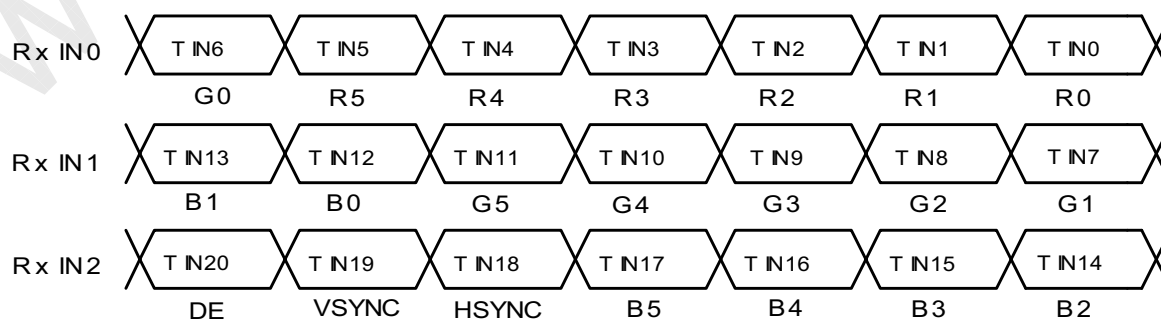
Connector : 20347-030E-02/I-PEX

Mating Connector : 20345-*30T-##/I-PEX

Terminal No.	Symbol	Function
1	VDD	+3.3V
2	VDD	+3.3V
3	VDD	+3.3V
4	VDD	+3.3V
5	GND	
6	GND	
7	GND	
8	GND	
9	GND	
10	RxIN0-	
11	RxIN0+	
12	GND	
13	RxIN1-	
14	RxIN1+	
15	GND	
16	RxIN2-	
17	RxIN2+	
18	GND	
19	RxCLKIN-	
20	RxCLKIN+	
21	GND	
22	N.C.	Non-Connection
23	VCD1	LED Cathode(Negative)
24	VCD2	LED Cathode(Negative)
25	VCD3	LED Cathode(Negative)
26	VCD4	LED Cathode(Negative)
27	VCD5	LED Cathode(Negative)
28	VCD6	LED Cathode(Negative)
29	N.C.	Non-Connection
30	VAD	LED Anode(Positive)

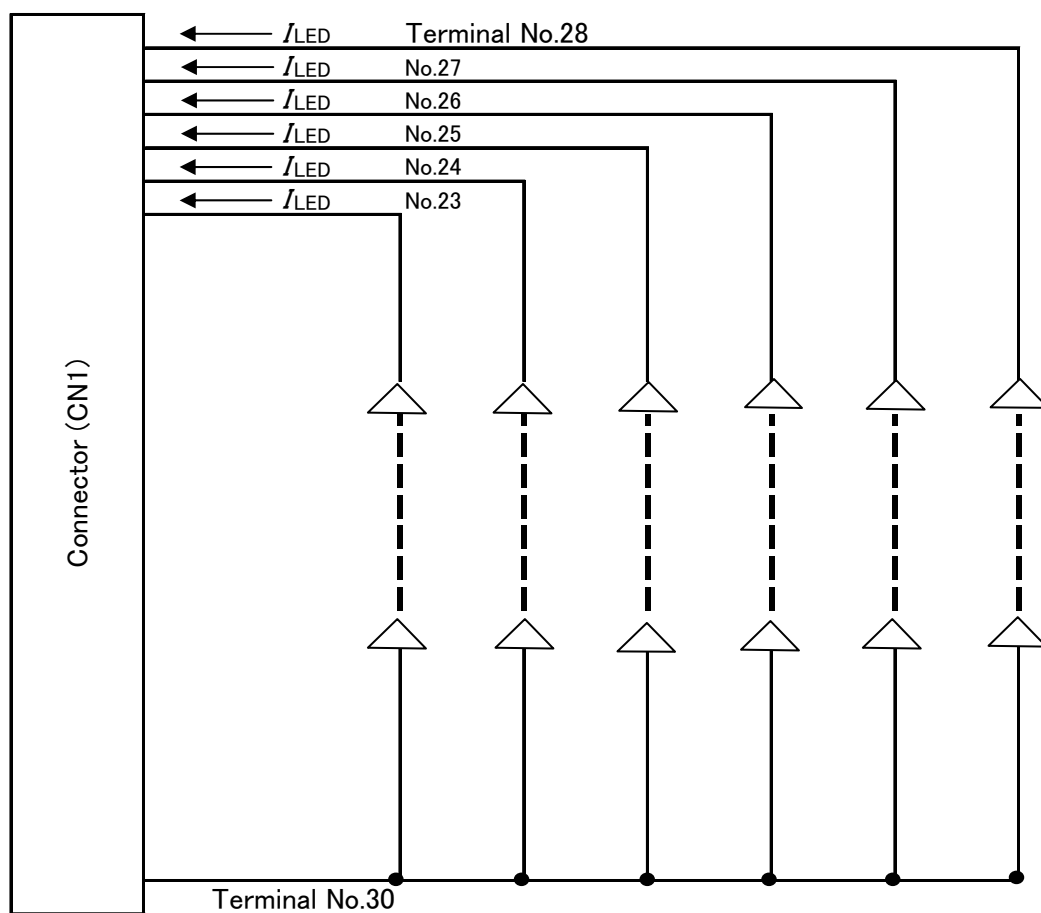
Note 1) Please connect GND pin to ground. Don't use it as no-connect nor connection with high impedance.

Note 2) Please connect NC to nothing. Don't connect it to ground nor to other signal input.



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EQUIVALENT CIRCUIT OF LED





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256k (k=1024) COLORS COMBINATION TABLE

	Display	R5 R4 R3 R2 R1 R0	G5 G4 G3 G2 G1 G0	B5 B4 B3 B2 B1 B0	Gray Scale Level
Basic Color	Black	L L L L L L L	L L L L L L L	L L L L L L L	-
	Blue	L L L L L L L	L L L L L L L	H H H H H H H	-
	Green	L L L L L L L	H H H H H H H	L L L L L L L	-
	Light Blue	L L L L L L L	H H H H H H H	H H H H H H H	-
	Red	H H H H H H H	L L L L L L L	L L L L L L L	-
	Purple	H H H H H H H	L L L L L L L	H H H H H H H	-
	Yellow	H H H H H H H	H H H H H H H	L L L L L L L	-
	White	H H H H H H H	H H H H H H H	H H H H H H H	-
Gray Scale of Red	Black	L L L L L L L	L L L L L L L	L L L L L L L	L 0
	Dark ↑ ↓ Light	L L L L L L H	L L L L L L L	L L L L L L L	L 1
		L L L L L H L	L L L L L L L	L L L L L L L	L 2
		⋮	⋮	⋮	L3... L60
		H H H H L H	L L L L L L L	L L L L L L L	L61
		H H H H H L	L L L L L L L	L L L L L L L	L62
	Red	H H H H H H	L L L L L L L	L L L L L L L	Red L63
	Black	L L L L L L L	L L L L L L L	L L L L L L L	L 0
Gray Scale of Green	Dark ↑ ↓ Light	L L L L L L L	L L L L L L H	L L L L L L L	L 1
		L L L L L L L	L L L L L H L	L L L L L L L	L 2
		⋮	⋮	⋮	L3... L60
		L L L L L L L	H H H H L H	L L L L L L L	L61
		L L L L L L L	H H H H H L	L L L L L L L	L62
	Green	L L L L L L L	H H H H H H	L L L L L L L	Green L63
	Black	L L L L L L L	L L L L L L L	L L L L L L L	L 0
Gray Scale of Blue	Dark ↑ ↓ Light	L L L L L L L	L L L L L L L	L L L L L L H	L 1
		L L L L L L L	L L L L L L L	L L L L H L	L 2
		⋮	⋮	⋮	L3... L60
		L L L L L L L	L L L L L L L	H H H H L H	L61
		L L L L L L L	L L L L L L L	H H H H H L	L62
	Blue	L L L L L L L	L L L L L L L	H H H H H H	Blue L63
	Black	L L L L L L L	L L L L L L L	L L L L L L L	L 0
Gray Scale of White & Black	Dark ↑ ↓ Light	L L L L L L H	L L L L L L H	L L L L L L H	L 1
		L L L L H L	L L L L H L	L L L L H L	L 2
		⋮	⋮	⋮	L3... L60
		H H H H L H	H H H H L H	H H H H L H	L61
		H H H H H L	H H H H H L	H H H H H L	L62
	White	H H H H H H	H H H H H H	H H H H H H	white L63

**FOR SAFETY**

LCD module is generally designed with precise parts to achieve light weighted thin mechanical dimensions.

In using our Modules, make certain that you fully understand and put into practice the warnings and safety precautions detailed in Engineering Information No.EE-D-001A,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA MATSUSHITA DISPLAY TECHNOLOGY CO., LTD LCD MODULES".

Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

1) SPECIAL PURPOSES

A) Toshiba Matsushita Display technology's Standard LCD Modules have not been customized for operation in extreme environments or for use in applications where performance failures could be life-threatening or otherwise catastrophic.

B) Since Toshiba Matsushita Display technology's Standard LCD Modules have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to abnormally high levels of vibration or shock which exceed Toshiba Matsushita Display technology's published specification limits.

C) In addition, since Toshiba Matsushita Display technology Standard LCD Modules have not been designed for use in applications where performance failures could be life-threatening or catastrophic, they must never be installed in aircraft navigation control systems (such as, but not limited to Traffic Collision Avoidance System and Air Traffic Indicator), in military defense or weapons systems, in critical industrial process-control systems (e.g., those involved in the production of nuclear energy), or in critical medical device or patient life-support systems.

2) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display.

Toshiba Matsushita Display technology does not warrant the module, if customer disassembled or modified it.

3) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT CONTACT the material with skin, if LCD panel is broken and liquid crystal material spills out.

If liquid crystal material comes into mouth or eyes, rinse mouth or eyes out with water immediately.

If this material contact with skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

4) GLASS OF LCD PANEL

BE CAREFUL WITH CHIPS OF GLASS that may cause injuring fingers or skin, when the glass is broken.

5) ELECTRIC SHOCK

DISCONNECT POWER SUPPLY before handling LCD module.

DO NOT TOUCH the parts inside LCD module and the fluorescent lamp's connector or cables in order to prevent electric shock, because high voltage is supplied to these parts from the inverter unit while power supply is turned on.

6) ABSOLUTE MAXIMUM RATINGS AND POWER PROTECTION CIRCUIT

DO NOT EXCEED the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.

Employ protection circuit for power supply, whenever the specification or TD specifies it.

Suitable protection circuit should be applied for each system design.

7) DISPOSAL

When dispose LCD module, obey to the applicable environmental regulations.